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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/755,452 | 01/13/2004 | Sergiy Yakovlevich Navala | 249/439 | 1075 |

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| EXAMINER | |
|---|---|
| PHILOGENE, HAISSA | |
| **ART UNIT** | **PAPER NUMBER** |
| 2828 | |

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/755,452 | NAVALA ET AL. | |
| | Examiner | Art Unit | |
| | Haissa Philogene | 2828 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,16 and 17* is/are rejected.

7)☒ Claim(s) *15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 January 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Drawings*

Figures 1-4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Brown, Pub. No. 2003/0209431.

Brown discloses in Figs. 4 and 5 a magnetron cathode comprising three or more magnet units (50, 52, 54), each of which comprises a single magnet (see page 3, paragraph [0036], lines 5-6), wherein one magnet unit 52 is disposed around the outer

circumference of another magnet unit 50 (see Fig.5) and adjacent magnet units (50, 52) have opposite poles facing toward the same direction (see Fig.4), wherein each of the magnet units (50, 52, 54) is formed in a circular shape (see Fig.5) and wherein each of the magnet units comprises a plurality of magnets (50, 52, 54) having the same poles (S in 52, 54 and N in 50) facing toward the same direction.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown in view of Shibamoto et al., Pub. No. 2003/0019739.

As per claim 2, Brown discloses the claimed invention substantially as explained above except for the magnet units being symmetrically disposed around the same axis. Shibamoto discloses in Fig.4 a magnetron cathode having magnet units 5 being symmetrically disposed around the same axis BA. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the symmetric arrangement of the magnet units as taught by Shibamoto into the Brown type magnetron cathode, because it would allow a magnetron sputtering as each is spun, thereby prolonging the lifetime of a target.

As per claim 3, Brown discloses the claimed invention substantially as explained above except for the innermost magnet unit having a hollow cavity inside thereof. Shibamoto discloses in Fig.4 a magnetron cathode having magnet units 5 wherein the innermost magnet unit formed nearest to the axis BA has a cylindrical or hollow cavity (as shown) inside into which at least a spindle 37 and coolant pipes (373, 374) and coolant channels (371, 372) are provided to allow communication with other parts of the magnetron cathode. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the innermost magnet as taught by Shibamoto into the Brown type magnetron cathode, because it would ensure a prevention of leakage and a highly-efficient sputtering discharge to a target.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brown in view of Gaertner et al., Patent No. 4,904,362.

Brown discloses the claimed invention substantially as explained above except for each of the magnet units being formed in a polygonal shape. Gaertner discloses a magnetron cathode with magnet units (31) capable of being formed in a polygonal shape (see abstract, lines 1-2 and 12-16). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ polygonal magnet units as taught by Gaertner into the Brown type magnetron cathode, because it would allow a sputtering process for sputtering surfaces having curved areas as the inner surfaces of hollow bodies.

Claims 7, 11, 13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art, Fig.1, in view of Brown.

As per claim 7, Applicant's admitted prior art, Fig.1, discloses a magnetron sputtering apparatus comprising a first electrode (19) on which a substrate (17) is disposed; a target (11) facing the substrate and made of a material to be deposited on the substrate, a second electrode (13) disposed on the rear surface of the target, a magnetron cathode (15, 29) disposed behind the second electrode and a support member (29) supporting the magnetron cathode. Applicant's admitted prior art does not disclose the magnetron cathode comprising three or more magnet units, each of which comprises a single magnet, wherein one magnet unit is arranged around the outer circumference of another magnet unit and adjacent magnet units have opposite poles facing toward the same direction. Brown discloses in Fig.4 a magnetron cathode comprising three or more magnet units (50, 52, 54), each of which comprises a single magnet (see page 3, paragraph [0036], lines 5-6), wherein one magnet unit 52 is disposed around the outer circumference of another magnet unit 50 (see Fig.5) and adjacent magnet units (50, 52) have opposite poles facing toward the same direction. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the magnetron cathode as taught by Brown into the Applicant's admitted prior art, because it would allow a magnetron sputtering cathode with a simplified design to provide excellent target utilization.

As per claims 11 and 13, Applicant's admitted prior art, Fig.1, in view of Brown discloses the claimed invention substantially as explained above. Further, Brown discloses each of the magnet units (50, 52, 54) being formed in a circular shape (see Fig.5) and each of

the magnet units comprising a plurality of magnets (50, 52, 54) having the same poles (S in 52, 54 and N in 50) facing toward the same direction.

As per claim 17, Applicant's admitted prior art, Fig.1, in view of Brown discloses the claimed invention substantially as explained above. In addition, Applicant's admitted prior art, Fig.1, discloses a substrate holder (19) readable as a first electrode for supporting the substratre 17 or an anode and a second electrode (13) receiving a voltage from a power supply unit 27 readable as a cathode.

Claims 8-10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art, Fig.1, in view of Brown as applied to claim 7 above, and further in view of Shibamoto.

As per claim 8, Applicant's admitted prior art, Fig.1, in view of Brown discloses the claimed invention substantially as explained above except for the magnet units being symmetrically disposed around the same axis. Shibamoto discloses in Fig.4 a magnetron cathode having magnet units 5 being symmetrically disposed around the same axis BA. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the symmetric arrangement of the magnet units as taught by Shibamoto into the Applicant's admitted prior art in view of Brown type magnetron cathode, because it would allow a magnetron sputtering as each is spun, thereby prolonging the lifetime of a target.

As per claim 14, Applicant's admitted prior art, Fig.1, in view of Brown and further in view of Shibamoto discloses the claimed invention substantially as explained above. In addition, Brown discloses each of the magnet units comprising a plurality of magnets (50, 52, 54) having the same poles (S in 52, 54 and N in 50) facing toward the same direction.

As per claim 9, Applicant's admitted prior art, Fig.1, in view of Brown discloses the claimed invention substantially as explained above except for the innermost magnet unit having a hollow cavity defined by the support member inside thereof. Shibamoto discloses in Fig.4 a magnetron cathode having magnet units 5 wherein the innermost magnet unit formed nearest to the axis BA has a cylindrical or hollow cavity inside (as shown) defined in part by support member (53) into which at least a spindle 37 and coolant pipes (373, 374) and coolant channels (371, 372) are provided to allow communication with other parts of the magnetron cathode. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the innermost magnet as taught by Shibamoto into the Brown type magnetron cathode, because it would ensure a prevention of leakage and a highly-efficient sputtering discharge to a target.

As per claim 10, Applicant's admitted prior art, Fig.1, in view of Brown and further in view of Shibamoto discloses the claimed invention substantially as explained above. In addition, Shibamoto discloses a cooling tube (373) in which inherent cooling water as coolant flows, which is disposed in the hollow cavity (as shown).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art, Fig.1, in view of Brown as applied to claim 7 above, and further in view of Gaertner et al.

Applicant's admitted prior art, Fig.1, in view of Brown discloses the claimed invention substantially as explained above except for each of the magnet units being formed in a polygonal shape. Gaertner discloses a magnetron cathode with magnet units (31) capable of being formed in a polygonal shape (see abstract, lines 1-2 and 12-16). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ polygonal magnet units as taught by Gaertner into the Applicant's admitted prior art, Fig.1, in view of Brown type magnetron cathode, because it would allow a sputtering process for sputtering surfaces having curved areas as the inner surfaces of hollow bodies.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art, Fig.1, in view of Brown as applied to claim 7 above, and further in view of Hillendahl et al., Patent No. 5,171,411.

Applicant's admitted prior art, Fig.1, in view of Brown discloses the claimed invention substantially as explained above except for a nozzle which is disposed near the target to supply an inert gas. Hillendahl discloses in Fig.1 a magnetron cathode having a nozzle (44) which is disposed near a target (20) to supply an inert gas from an inert gas source (42) via inlet tube (40). It would have been obvious to a person having

ordinary skill in the art at the time the invention was made to employ the nozzle as taught by Hillendahl into the Applicant's admitted prior art in view of Brown type magnetron cathode apparatus, because it would a distribution of an inert gas which breaks down into electrically charged ions under the influence of electric field.

***Allowable Subject Matter***

Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to disclose "the substrate is disposed as close to the target as the 1/4 or less of the width of the target".

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Scobey et al., Patent No. 5,656,138 ; Hosokawa et al., Patent No. 5,382,344 ; Zega, Patent No. 4,407,713 ; Shin et al., Pub. No. 2003/0178299.

***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Haissa Philogene whose telephone number is (571) 272-1827. The examiner can normally be reached on 8:30 A.M.-6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

hp

Haissa Philogene
Primary Examiner
A.U. 2881